

# CHAPTER 7

## SEWER SYSTEM STANDARDS AND EMERGENCY PROCEDURES

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### 7.1 INTRODUCTION

This chapter summarizes the existing City of Chula Vista general sewer design criteria including, in particular, the specified methodology for determining design capacity, and provides recommended changes to the criteria based on findings of the Master Plan engineering evaluations and review of current industry standards. The chapter additionally includes a summary of the City's current emergency response procedures, including additional general response guidance.

Sewer design criteria are specified in the City's Subdivision Manual Section 3-300 (revised 7/1/2002), which is provided in Appendix N. The criteria include standards for design capacity calculation, gravity sewer design, and force main and pump station design. The City's emergency response procedures are given in the current *Sewer Overflow Response Plan* (January 2005), which is provided in Appendix O.

### 7.2 GENERAL SEWER DESIGN

#### Design Capacity

The design criteria for public sewers are based on residential (R1) zoning and land use with a density of 4 dwelling units per acre and 3.3 persons per dwelling unit.

#### Wastewater Generation

To ensure adequate capacity new sewers should be designed to convey peak wet-weather flows. As presented in Chapter 3 – Wastewater Generation, average dry-weather generation rates for single-family residences based on calibrated hydraulic models of the existing collection system ranged from 195 to 225 gpd/DU. Using the high end of this range yields a dry weather generation rate of approximately 70 gpd per capita based on an average density of 3.3 people per dwelling unit. Applying a standard inflow and infiltration allowance of 10 percent to the dry-weather rate gives a recommended design unit generation rate of 77 gpd per person or approximately 250 gpd per EDU. Recommended generation rates for multi-family dwellings are based on an average density of 2.5 people per dwelling, which yields approximately 190 gpd per dwelling. Based on the City's desire to provide for a minimum flow from non-residential acreage equal to 10 EDUs, the design unit generation rate for non-residential development is

## **Sewer System Standards & Emergency Procedures**

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2,500 gpd per acre. These generation rates are consistent with the City's adopted design rates specified in the City Subdivision Manual. Table 7-1 provides the adopted design wastewater generation rates.

To account for the daily variations in the wastewater flow rate, the peak design flow rate within a specific reach of sewer is approximated by multiplying the total average flow rate in the reach by a factor specified in Chula Vista Design Standard (CVDS) 18. This peaking factor is a function of the total population draining to the reach.

**Table 7-1**  
**Recommended Sewer Design Unit Generation Rates**

<b>Land Use</b>	<b>Unit Generation Rate</b>
Residential (R-1 and R-2)	265 gpd per dwelling unit
Residential (R-3 and MHP)	199 gpd per dwelling unit
Commercial/Industrial/Institutional	2,500 gpd per acre
Parks	500 gpd per acre
Elementary School	15 gpd per capita
Junior High and High School	20 gpd per capita

### ***Sewer Design Capacity***

Sewer design capacity will be based on the peak flow rate estimated by the unit generation rates specified in Table 7-1 and CVDS 18. Flow depths will be estimated by use of Manning's equation. Table 7-2 gives the hydraulic design criteria specified in the Subdivision Manual.

**Table 7-2**  
**Hydraulic Sewer Design Criteria**

<b>Parameter</b>	<b>Criteria</b>
Peak flow depth to pipe diameter ratio (d/D)	0.50 for $d \leq 12$ -inches 0.75 for $d > 12$ -inches
Manning 'n' factor	0.013 for VCP or RCP, $d \leq 21$ -inches 0.012 for VCP or RCP, $d > 21$ -inches 0.012 for PVC, all sizes
Minimum velocity	2 feet/second
Maximum velocity	12 feet/second

## **Design Criteria**

Detailed design criteria for gravity sewers are provided in the Subdivision Manual Section 3-302 and for force mains and pump stations in Section 3-303. An engineering review of the criteria was performed and provided to the City. General comments regarding the current criteria include:

- General criteria are adequate, however, updating of requirements is recommended
- Force main and pump station requirements are suitable for design of temporary facilities, however, expanded requirements for permanent facilities are recommended
- It is recommended that the Subdivision Manual design criteria for pump stations be limited to smaller capacity facilities, it may be advantageous to reference the City of San Diego pump station requirements for all permanent pump stations and temporary pump stations over one million gallons per day capacity
- It is recommended that the design criteria reference NFP 820 and NEMA ratings for all electrical classification requirements
- It is recommended that the design criteria reference OSHA requirements
- It is recommended that the criteria include calculation standards, including hydraulic, pipeline loading, pump station, odor control, superelevation, and other calculations
- It is recommended that a separate section is added to address odor control requirements

## **7.3 SANITARY SEWER OVERFLOW PREVENTION PROGRAM**

The City is continuously improving and updating its proactive sewer system maintenance program with the objective of minimizing the potential for Sanitary Sewer Overflows (SSO). Sewer system reliability is equated to stable on-going maintenance modes. The City's goal is to avoid reliance on reactive maintenance and to this end, the maintenance schedule seeks to allow staff to visit, clean, and document every line segment as required using a schedule that is flexible enough to adjust to conditions found during cleaning. As the system ages and deteriorates, it is normal for a larger portion of the system to require more frequent cleaning, thereby increasing the annual amount of pipeline cleaning. Proposed enhancements to the existing maintenance program, including establishing an expanded CCTV inspection program and the acquisition of additional equipment and resources will significantly reduce the potential of SSOs.

The City's preventative and corrective maintenance programs consist of routine maintenance, repairs, and replacement of sewer mains, manholes, laterals, and pump stations. The program provides for the inspection, cleaning, and related maintenance of all components of the collection system. Potential problems are input into the Integrated Infrastructure Management System (IIMS) and are scheduled according to the severity of the problem. Larger and more complex projects are included in the Capital Improvement Projects (CIP) process for planning, design, and construction.

## **Sewer System Standards & Emergency Procedures**

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If a sewer overflow occurs due to a sewer main stoppage or mechanical breakdown, the problem is investigated and analyzed. Maintenance schedules or cleaning methods are adjusted accordingly. If a repair or replacement to an infrastructure component is needed, the repair will be included in the CIP process, or be repaired by City crews.

The following are preventive measures that the City of Chula Vista incorporates in the sewer overflow prevention plan:

### **Maintenance Program**

#### *Preventive Measures:*

- A. Routine Sewer Main cleaning - Four Vac-con combination vehicles clean City sewer mains on a daily basis.
- B. Critical Main Cleaning Program - Monthly main cleaning of low flow and known grease problem areas.
- C. Chemical/Enzyme Application Program – Application of chemical/enzyme 3 days a week at severely impacted sewer main and manholes.
- D. Sewer Main and Manhole Inspection Program – Daily visual and/or televised inspection of sewer mains and manholes.
- E. Sewer Main Replacement (CIP) – The repair, replacement, or rehabilitation of impacted sewers to improve sewer flow velocities and/or increase volume.

### **Root Control**

#### *Preventive Measures:*

- A. Routine Sewer Main cleaning - Four Vac-con combination vehicles clean city sewer mains on a daily basis.
- B. Mechanical Rodding – Rodding known areas with root cutters on a quarterly, or as needed basis.
- C. Sewer Main and Manhole Inspection Program – Daily visual and/or televised inspection of sewer mains and manholes for root intrusion.
- D. Sewer Main Replacement (CIP) – The repair, replacement, or rehabilitation of impacted sewers to eliminate long-term root problems.

### **Control of Rocks, Debris and Vandalism**

#### *Preventive Measures:*

- A. Sewer Manhole Locking – Install locking manhole covers or seal non-locking manhole covers in off-road and other secluded areas as well as previously vandalized manholes.
- B. Sewer Main and Manhole Inspection Program – Daily visual and/or televised inspection of sewer mains and manholes.

### **Pipeline Failure and Construction Damage**

#### *Preventive Measures:*

- A. Sewer Main and Manhole Inspection Program – Daily visual and/or televised inspection of sewer mains and manholes. Manhole and mains are monitored for deterioration.
- B. Sewer Main and Manhole Maintenance – Repair, relocation, and or protection of sewer mains and manholes from potential damage.
- C. Routine Sewer Main cleaning - Four Vac-con combination vehicles clean city sewer mains on a daily basis.
- D. Sewer Main Replacement (CIP) – The repair, replacement, or rehabilitation or relocation of sewers and manholes prone to damage by any source.
- E. Dual Force Mains – Installation of dual force mains at new sewer pump stations when needed.

### **Power Outages and Pump Station Failures**

#### *Preventive Measures:*

- A. Backup Power – Provide on site generators for back-up electrical power at most city pump stations.
- B. Portable Generator Capability – Provide portable back-up generator capability sufficient to operate all sewer pump stations that do not have on-site generators or alternate power feeds.
- C. Retention Ponds and Wells – Larger volume pump stations are provided with retention ponds in case of pump station failure. Some smaller volume stations are provided with wet wells that have some retention time as well as having emergency pump down lines that can be connected to portable pumps.
- D. Sewer Pump Station Maintenance Program – All pump stations are checked three days a week for proper operation. Provide scheduled preventative and corrective maintenance on pump station electrical and mechanical components as well as contracted quarterly maintenance on the on-site generators.

## **7.4 EMERGENCY RESPONSE PROCEDURES**

The City has procedures in place to ensure any reported SSO is responded to immediately, to protect the public health and safety, and to protect the beneficial uses of the waters of the United States. The following sections summarize general recommended procedures for emergency response.

### **SSO Notification Procedure**

City Employees or the general public (businesses, residents, etc.) may detect an overflow, or report suspicious circumstances (unusual odors, flooding, etc.) that could indicate the possibility of an overflow. During normal business hours calls received by the City are routed or forwarded by the dispatcher for response. During non-business hours and weekends, calls are received by the on-call emergency dispatch police and forwarded to the appropriate on-call staff. Once the City receives the initial report, crews from the appropriate department are dispatched. Additional personnel and emergency resources are on-call 24 hours a day, should assistance be needed.

If the originating spill enters into areas outside the City's service area, the spill will continue to be contained and the affected agency will be notified of the spill to ensure proper cleaning and notifications are completed.

### **SSO Response**

Failure of any element within the collection system that threatens to cause or causes an SSO triggers an immediate response by City staff to isolate and correct the problem. When the City receives a call of a possible sewer overflow, maintenance and operations staff and resources are dispatched to the location to confirm and conduct an initial assessment of the problem. Staff notification is made by telephone or radio. The dispatcher relays instructions concerning the appropriate crews, materials, equipment, and supplies to be dispatched. SSOs will be immediately contained to the greatest extent possible utilizing available equipment and resources.

### ***Traffic and Crowd Control***

General traffic and crowd control used for SSO situations is summarized as follows:

#### **Small Spill (up to 1,000 gallons)**

- A. Set up traffic cones to direct traffic away from spill area
- B. Use staff personnel to control traffic and pedestrians

#### **Medium Spill (1,000 to 10,000 gallons)**

- A. Contact regulatory agencies as required
- B. Perform lane closures as needed
- C. Close any affected entrances or exits from all public and private facilities
- D. Place proper signage for any lane closures including contaminated area signs
- E. Use caution tape and barricades to protect pedestrians from contaminated area

Large Spill (greater than 10,000 gallons)

- A. Access spill situation
- B. Contact regulatory agencies as required
- C. Inform City Police Department of any law enforcement assistance required for road closures and traffic control
- D. Delegate responsibilities to the San Diego County Department of Environmental Health to inform public of hazards, also use signage to inform public of potential hazards to public health and safety
- E. Block public access to hazards using barricades, cones, and caution tape

### ***Preliminary Assessment of Damage to Private/Public Property***

Upon arrival, the initial responder gathers information immediately available and determines if the spill is from the sewer. Once determined to be a sewer spill, all spills, whether private or public, will be contained and cleaned up before the spill reaches storm drains or other drainage facilities. Upon containing and cleaning the spill proper documentation will be completed. If available, digital photos should be taken as supporting documentation of the spill, and the proper procedures used for containment and cleanup.

### **Overflow Correction, Containment, and Clean-up**

SSOs may result from blocked or restricted sewers, pipe failures, flow exceeding the capacity of the system, or other natural or man-made causes. The following section describes specific actions typically performed by City staff in the event of an SSO. The objectives of these response procedures are to:

- Protect public health, the environment, and property from SSOs
- Prevent the discharge of wastewater into surface waters
- Contain the wastewater discharged to the maximum extent possible
- Establish perimeters and control zones to control public access to SSO area
- Prompt notification of spill information and potential impacts

The City oversees all response actions within the City service area using City staff or contractors. These personnel have the skill and experience to respond rapidly and determine the most effective course of action in the timeliest manner. The City has call out procedures in place in the event of emergencies or where additional resources are required, such as for a major spill.

### ***Responsibility of Responder Upon Arrival***

It is the responsibility of the first City responder upon arrival at the site of an SSO to protect the health and safety of the public by mitigating the impacts of the SSO to the greatest extent

## **Sewer System Standards & Emergency Procedures**

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possible. Should the first responder determine the SSO is not the responsibility of the City, but there exists imminent danger to public health, property, or to the public waterways of the United States, then prudent emergency action should be taken until the responsible party provides action to mitigate the SSO. Upon arrival at an SSO the primary responsibility of the first City responder is to do the following:

- Determine the cause of the SSO, e.g. sewer line blockage or pipe failure;
- Identify and request, if necessary, additional personnel, materials, and equipment to minimize impacts of the SSO;
- Control public access to spill area; and
- If possible, take immediate steps to stop the overflow.

### ***Initial Measures and Containment***

The following are typical initial measures to contain the SSO and recover, where possible, sewage that has already spilled in order to minimize the impact to the public and the environment:

- Determine the immediate destination of the SSO, e.g. storm drain, gutter, culvert, etc.
- Take immediate steps to contain the overflow, e.g. block or bag storm drain, recover with Vac-con truck, divert or bypass pump into downstream manhole
- Small spills up to 1,000 gallons, use sandbags and/or earthen curbs to direct flows away from storm drains and attempt to contain SSO if possible
- Medium spills of 1,000 to 10,000 gallons include all of the above and utilize contractors if needed
- Large spills greater than 10,000 gallons include all of the above and build additional emergency containment areas downstream of SSO, if possible, and initiate access plan into storm or flood control channels to contain SSOs that enter storm drain system

### ***Additional Measures for Prolonged Overflow Conditions***

In the event of a prolonged SSO or sewer line collapse, typical City actions include:

- Sep up a potable by-pass pump operation around the problem/obstruction, contractors may be utilized in the event of a prolonged overflow
- Implement continuous or periodic monitoring of the by-pass operation as necessary



### ***Clean-Up***

All SSO sites require thorough cleaning after an overflow, with the objective that no readily identifiable residue remains at the site. Typical procedures for clean-up of spills include:

- Where practical, the area is thoroughly flushed and cleaned using high-pressure water hose or Vac-con truck. Solids and debris are flushed, contained, vacuumed, and hauled away. All flush water is required to be contained and collected for proper disposal.
- The SSO site is secured to prevent contact by members of the public until the site has been thoroughly cleaned. If required, signs concerning public health and safety should be posted.
- Where appropriate, the SSO site is disinfected and deodorized using liquid bleach, (HTH), or other agent. Ensure proper contact time for adequate disinfection. Note that if wastewater has discharged into a body of water that may contain fish or other aquatic life, DO NOT disinfect, contact appropriate agency for further instructions.
- Where wastewater has resulted in ponding, pump dry and remove all residues.

### ***Monitoring***

In the event that an SSO enters surface waters, a water quality monitoring program should be conducted that would typically include the following procedures:

- Water quality samples are collected upstream and downstream of the spill site
- The sample location, time, and water temperature should be logged on the chain of custody
- A map of the sample locations should be made so that follow-up testing can be performed
- Spill should be analyzed, at a minimum for:
  - Ammonia Nitrogen,
  - Biochemical Oxygen Demand (BOD),
  - Dissolved Oxygen (DO),
  - Total Fecal Coliform,
  - Total Suspended Solids (TSS), and
  - Additional sampling requirements as imposed by the Regional Water Quality Control Board (RWQCB).

Spills to the ground should be monitored per the requirements imposed by the RWQCB.

### **Regulatory Agency Notification**

Any spills exceeding 1000 gallons or 50 gallons which pose a threat to public health or the environment, are required to be reported to the RWQCB on the next working day. Any spill greater than 1000 gallons that reaches surface water must be immediately reported to the RWQCB. In addition any spill greater than 50 gallons; any discharge to the ocean, bay, river, flowing stream, open storm drain, or drinking water reservoir; or any spill near homes, schools, parks, or areas accessible to the public are required to be reported to the County of San Diego Department of Environmental Health. Any spill in excess of 1,000 gallons must additionally be reported to the State Office of Emergency Services and Department of Fish and Game.